# TWO CASES OF TUMOR IN THE FOURTH VENTRICLE AND CEREBELLUM.*

By L. NEWMARK and MILTON B. LENNON, San Francisco.

In both of these cases vomiting was the initial symptom. It was not until late in the first case that the diagnosis was made, and it was only through the experience gained in the first case that a diagnosis of the location and nature of the disease was ventured early in the second.

The first patient, L. Z., was thirty-five years old when he came under the observation of one of us in January, 1903. He related that in November, 1902, he had had considerable vomiting and dizziness for several days; it ceased after he had taken some phosphoric acid. He then went to New York, and there the vomiting became very troublesome. He never succeeded in raising his gaze high enough to see the top of the Flatiron building, as an attempt threatened a vomit. Dizziness attended the vomiting. At the time of our first examination he was fairly safe while he remained in bed, but when he arose he felt a slight vertigo and soon vomited. He could not say that he felt as if he were turning or swaying or that the room was turning about him. He had no headache.

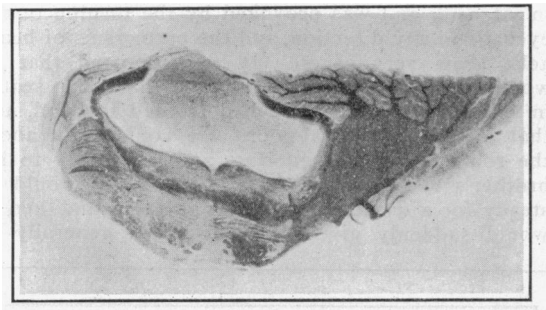

Fig. 1.

After a thorough examination nothing abnormal in the central nervous system was demonstrated. Dr. J. O. Hirschfelder examined the stomach and found it normal. The passage of a galvanic current through the patient's head, either transversely or in a fronto-occipital direction, did not cause dizziness and did not make him vomit. His appetite was good. For a while during the month of February he vomited only once daily, and gained in weight. The vomiting generally occurred in the morning before breakfast, but he might go all day without vomiting and then vomit in the evening. There was a constant feeling of unsteadiness, but his gait was normal at this time.

The vomiting was cerebral in character, and those who were concerned in the case looked carefully for signs of disease in the cerebellum, the medulla oblongata or the labyrinth, but they could only express suspicions and leave it to time to confirm or refute their opinions. We lost sight of the patient at the beginning of March and did not see him again until one day in June, when one of us met him in the street. He said that he had not vomited for two weeks, but was not sure of himself yet. He was walking with an attendant, who held him by the arm, and he made the impression of a blind man who was being led. From July on, thanks to the kindness of Dr. Krotoszyner, we were again enabled to observe him regularly.

* From the Neuropathological Laboratory of the San Francisco Polyclinic.

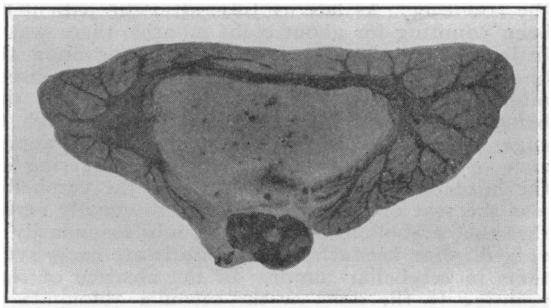

Fig. 2.

In the patient's boyhood his right eye had been operated upon for traumatic cataract. Vision with that eye was reduced to counting fingers. The pupil was oval, the disc light gray, and there was a large white patch in the choroid. Between the end of January and the beginning of March the left eye was repeatedly examined and the fundus found to be normal. As late as the 8th of June Dr. Nagel found nothing wrong in the left eye; but on the 4th of July he observed that the edge of the disc was not as clear as it had been on the 8th of June, and this together with a contraction of the visual field for red and green seemed to Dr. Nagel to justify the assumption of an incipient optic neuritis. It was not, however, until about the middle of August that the optic neuritis became well marked. The disc then became choked, retinal hemorrhages supervened and vision was considerably impaired. At no time in the course of the disease was any further change observed in the background of the right eye.

When re-examined in July the patient presented signs of disease of the cerebellum. He had difficulty in maintaining his balance; it was at first slight, but during the following month it grew worse. The tendency was to fall forwards or backwards. Finally he could not balance himself at all and became bedridden. There was lateral nystagmus. Headaches at that time were mentioned by the patient only when inquiry was made about them: they were at first infrequent, but very severe when they did occur. In August they became very frequent and very severe; the pain was chiefly in the occiput. The vomiting continued. Although his appetite remained good he grew thin and feeble. Hiccoughs were frequent for weeks before his death. Swallowing was undisturbed. The functions of the cranial nerves were preserved. Ataxia of the limbs was not distinct: sometimes there was some uncertainty in touching the tip of his nose with his finger, but the results of this test were not constant. There was no paralysis or disturbance of sensation in the extremities. The tendon reflexes were very lively; sometimes there was patellar clonus, and ankle clonus could generally be elicited in the latter stage of the disease. The plantar reflex was perfectly normal throughout.

In the month of August mental changes were noticed for the first time; an irrelevant remark would startle his wife, and it was also noticed that his memory was failing. The memory was poor only for recent events and this defect did not escape the patient himself. During the last five weeks of his life he frequently became very much confused as to time and place; but he often participated intelligently in the conversation of those about him and preserved his native cheerfulness and wit almost to the last. He died on the 12th of October, 1903.

It will be seen from the foregoing account that the course of the disease throughout the greater part of its duration was rather monotonous, for the

symptomatology was confined for several months to the vomiting. As late as July, after the patient had been vomiting for about eight months, there was so little to base the diagnosis of a tumor upon that one observer of the case suggested that the disease might be multiple sclerosis, the disc at that time being rather pale in its temporal part, though the edge was blurred. With the unmistakable appearance of the papillitis, the cerebellar staggering and the headache it became certain that the cerebellum was the seat of disease, but we were equally certain that the cerebellum had become only secondarily involved. For headache and papillitis are early symptoms in cerebellar tumor. In the absence of signs pointing to the pons or the medulla oblongata the fourth ventricle was thought to conceal the offending growth; it was suspected that it might be a cysticercus. Needless to say that specific treatment had been tried.

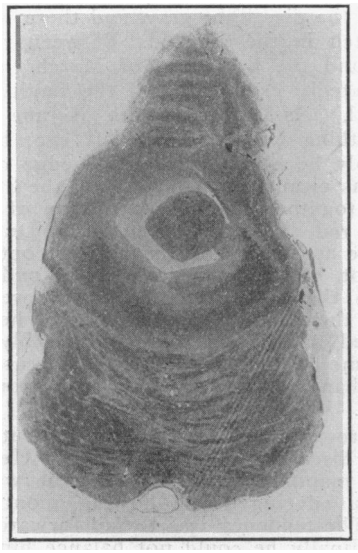

Fig. 3.

After the brain had been removed from the skull no tumor was visible on the surface; but when the medulla oblongata was raised a little it was seen that the fourth ventricle contained a pathological product. Transverse sections including the cerebellum were made through the pons and medulla oblongata at various levels and stained with hematoxylin to exhibit the myelinated nerve fibers.

A round-celled sarcoma was revealed in the fourth ventricle, extending from the level of the corpora quadrigemina to the caudal region of the medulla oblongata. Its size increases gradually from the upper to the lower levels; thus, it measures about the region of the emergence of the trigeminus ¾ of an inch to one inch from right to left, at the level of the abducens 1⅜, and in a section comprising the cerebellum and the medulla in the region of the nuclei of the columns of Goll and of Burdach a little more than two inches. It does not invade the tissue underlying the floor of the ventricle at any point, but has dilated the ventricle enormously by pushing aside and compressing the superior cerebellar peduncles, which are connected by a thread of medullated tissue, the remnant of the anterior medullary velum, forming the roof of the ventricle (Fig. 1); and lower down it has grown into the cerebellum, destroying all the vermis included between the two corpora dentata and the medulla oblongata (Fig. 2). In the pontile regions of the fourth ventricle the growth is attached to the roof of the ventricle and projects into the space below.

Case II. In January, 1905, Dr. T. Edward Bailey referred to one of us R. W., a printer, 32 years old, who was troubled with vomiting, especially in the morning. There had been nothing about him to suggest a serious affection of the central nervous system, but as treatment applied to his stomach had not benefited him it was thought proper to seek for the disease in other parts. But a thorough examination in the month of January, 1905, revealed no lesion of the brain or cord. Turning abruptly, looking upward or downward, provoked at that time neither dizziness nor vomiting. The patient mentioned that he felt dizzy at times. Mindful of what the previous case had taught the suspicion was expressed to Dr. Bailey that the patient might have a tumor in the fourth ventricle. He was seen a few times more early in 1905, but nothing more was discovered than at first. There was no headache at all. Then many months elapsed during which we did not see him, until he presented himself again on the 25th of October, 1905. He had now severe pains in his head, especially through the temples, and his vision had failed. He continued to vomit. The symptoms observed on this occasion were beginning optic neuritis, more pronounced in the left eye than in the right, slight nystagmus, particularly when he looked to the right, and exaggerated knee-jerks.

In the course of the next two or three months the discs became more swollen, the nystagmus increased in intensity and was provoked by the turning of the eyeballs in any direction, and the paroxysms of headache grew very severe. It was reported that he would vomit four nights out of six, that when seated in a low rocking-chair he had pitched forward, and that his memory was poor. He could walk about the room without staggering, and, according to his brother's testimony, his gait in the street would be steady for a quarter of an hour at a time and then he would suddenly give a violent lurch, generally to

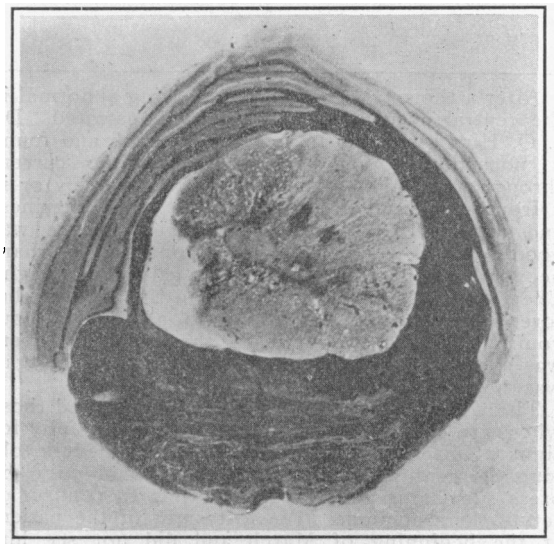

Fig. 4.

the right. On January 4th, 1906, it was noted that when he stood with his feet quite close together, with his eyes open or closed, his station was remarkably steady. From this time on he complained of paresthesia in the left side of the tongue and lower lip, or in the upper teeth or the cheek on the left. It seemed sometimes as if the sensibility of

those parts to stimulation by cold was slightly reduced, but other stimuli produced a normal effect. At no time was there any disturbance of sensibility of any kind except the paresthesia mentioned; nor was there any purely motor disturbance. The plan-

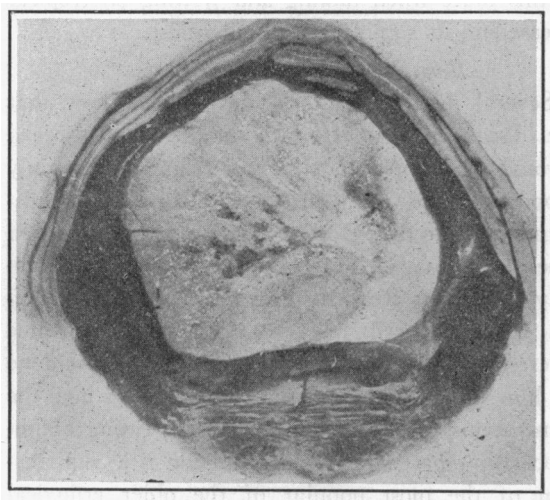

Fig. 5.

tar and corneal and other superficial reflexes were normal. The deep reflexes of the extremities were exaggerated. The cranial nerves, except the optic, were normal. There was no ataxia of the extremities, no asynergy, no adiadokokinesis. The pain was rarely felt in the back of the neck. He could not locate it at all sometimes. It was most frequently stated to be on the top of the head. Once, when very severe, it was felt "in front on the right." His pulse was generally about normal; once, late in the disease, after a great exertion, it sank to 52.

In March, 1906, he could not remain upright any more. His eyesight was now much reduced. The earthquake of 1906 separated us. We did not see him alive again, but observing the notice of his death in the newspapers one day in October, 1906, we sought, and obtained, permission for an autopsy.

As in the preceding case, when the contents of the skull were removed no tumor was visible or palpable until by lifting the cut end of the medulla oblongata one was exposed in the fourth ventricle. A section through the corpora quadrigemina and decussation of the superior cerebellar peduncles shows the tip of the tumor lying free in the dilated aqueduct of Sylvius. One farther down through the posterior corpora quadrigemina, where the superior cerebellar peduncles just meet at the median line of the pons, shows the tumor projecting from the left side of the ventricle by a broad pedicle. (Fig. 3.) At the insertion of the pedicle the gray matter normally lining the ventricle has for the most part disappeared, and here also the root of the fourth nerve is much reduced in size while its fellow on the opposite side is undiminished. The tumor grows rapidly and has almost doubled in size before we lose sight of the posterior corpora quadrigemina on our progress caudalwards. As it grows the surface by which it projects from the side of the ventricle becomes more extensive; near the middle of the pons it is continuous with all the left side of the enormously dilated ventricle and with more than half of its floor and roof. In the upper pons the nasal root of the trigeminus can be distinguished on the side of the tumor as well as on the other. The misshapen, compressed left superior cerebellar peduncle is in intimate contact with the tumor, and the corresponding lateral fillet cannot be clearly discerned at its side. The right superior cerebellar peduncle also shows the effect of tension by its elongated and slender shape. The central gray matter has been entirely replaced by the tumor, and also on the side opposite to the tumor it is very much diminished. Of the nasal root of the trigeminus nothing is to be seen in many sections preceding the middle level of the pons. A glance at the illustrations (Figures 4 and 5) will show the effects of the growth.

Near the caudal end of the pons the tumor almost fills the ventricle, leaving only a narrow space along the right side. The tumor is bounded here laterally by the corpora dentata of the cerebellum. It forces its way between the cerebellum and the restiform bodies of the medulla oblongata. A section through the medulla shows signs of slight compression. The growth encroaches upon the substance of the medulla on the right and the left, chiefly at points corresponding to the restiform bodies. The epithelial lining of the floor of the ventricle is preserved at the median line and for a short distance on either side of it. The tumor may still be seen in the ventricle in sections just above the lower pole of the olivary body.

In the cerebellum where the tumor has attained its greatest size, measuring 4 cm. in its lateral and 3¾ cm. in its dorso-ventral diameter, it occupies the whole of the vermis with the exception of about half a centimeter of cerebellar substance covering its dorsal surface; it emerges on the ventral surface of the cerebellum. (Fig. 6.) The dentate bodies have been pushed apart, and the tumor occupies almost the whole space between them. The right dentate nucleus is stretched and its dentations are flattened so that it has lost the form of a sack. The left dentate body is intact. A series of vertico-transverse sections show the gradual diminution of the tumor as we recede towards the posterior border of the

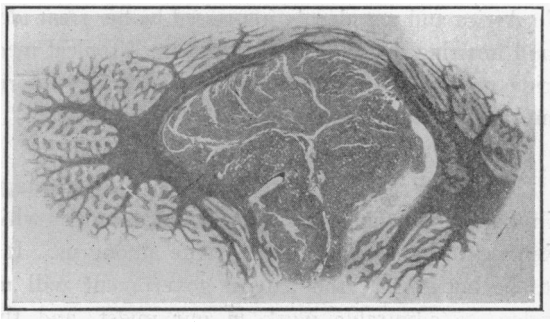

Fig. 6.

cerebellum. Just before the dentate bodies disappear the growth still occupies most of the inferior vermis. It thereafter withdraws more and more into the dorsal part of the inferior vermis, becoming smaller, until we finally find the posterior part of the inferior as well as the superior vermis normal. The tumor is a round-celled sarcoma.

In both of these cases there was a first stage in which the sole symptoms were vomiting and a sense of giddiness. A second stage was marked by the supervention of the general symptoms of brain tumor, that is, the headache and the choked disc, and of the special symptoms of a cerebellar affection, that is, the disturbance of balance. In the first stage one would hesitate to infer a tumor in the absence of headache and choked disc; in the second, a cerebellar tumor would be confidently diag-

nosed, but if ignorant of the order of events one would be likely to err in respect of its origin and extent, and hence in respect of its operability.

It seems justified to assume that the first stage coincides with the development of the growth within the fourth ventricle, and the second with its invasion of the vermis of the cerebellum. In the case of L. Z. his friends in their despair urged an operation, but his death immediately after entering the hospital frustrated it. In the case of R. W. the diagnosis was precisely stated as "a tumor in the fourth ventricle and middle lobe of the cerebellum," and a decompressive operation mentioned as a means of palliation; but this was rejected.

We are under obligations to Dr. D'Arcy Power, of the San Francisco Polyclinic, for his kindness in photographing the sections.

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## COMMENTS ON TROPICAL MEDICINE.

By CREIGHTON WELLMAN, Oakland.

### *Professor Koch and the Elucidation of Tropical Disease.*

The last years of Professor Robert Koch's life were almost entirely given up to the study of tropical disease. His work in South Africa on diseases of animals and his numerous expeditions to East Africa to investigate malaria, sleeping sickness, tick fever, plague and other tropical scourges were attended by great hardship and unremitting toil. The writer had the privilege of conferring with Professor Koch regarding some of the problems presented by disease in Africa and was deeply impressed by his great ideas and untiring devotion to this cause. Tropical medicine no less than bacteriology claimed the interest and genius of Robert Koch.

### *Human Plague Again.*

The occurrence of another case of human plague in California emphasizes the continued danger which inheres in persistent rodent plague among us. It is to be hoped that the federal government will not relax its admirable work in our midst, and that the State and profession of California will continue every effort to protect our citizens from a possible epidemic of this disease.

### *Tropical Medicine at Vallejo.*

The last meeting of the Northern California Medical Society, held at Vallejo, was the occasion of an enthusiastic symposium on tropical medicine. Dr. C. J. Geiger, of the Navy, read a paper on Gangosa, a new and formidable tropical disease which has appeared among us. Dr. H. R. Oliver, of San Francisco, presented a paper on hookworm in California, and Dr. Herbert Gunn, of San Francisco, and the writer each gave general addresses on some of the tropical diseases of this State. The discussion of these papers and addresses, which was opened by Dr. Simons, of the Navy, was of great interest and well showed the interest and intelligent attitude of California physicians toward these important questions. To the writer nothing is more gratifying than the point of view expressed by the best medical men of this State when talking and writing on tropical disease and its significance in our midst.

### *Beri-Beri in the United States.*

Several recent articles on this subject show that the disease named is much more widely spread throughout temperate America than is commonly supposed. The yearly deaths from beri-beri in California indicate that there are always several hundred cases in the State. The large part of these are probably Japanese. Recently Fraser (New York Medical Journal, April 30, 1910) has published some interesting work on the aetiology of the disease done by him in the Philippines. According to him the cause seems to be connected with the eating of improperly prepared rice, which opinion is a confirmation of the most popular of the older etilogical theories. It is very desirable that physicians in this State report all cases occurring in their practice.

### *The American Society of Tropical Medicine.*

This society held a most important meeting at the Medical Department of the University of St. Louis, on May 11. Colonel Wm. C. Gorgas presided and the papers read were of exceptional value. The American Society of Tropical Medicine, which was organized by a few far-seeing men at a time when tropical medicine was regarded by many as an academical hobby, has grown to be one of the most useful scientific societies in the United States, and as it enters its era of great prosperity and growth we repeat our good wishes which we expressed at its inception, and add that our hopes for it have been fulfilled, but that our expectations regarding its future influence have widened and we wish the society all success in meeting them.

### *The Concealment of Lepers.*

The writer was called to Pleasanton, California, a few weeks ago and while there confirmed the diagnosis of leprosy made by the family physician and the local health officer in the case of two boys who are now in the Alameda County Infirmary. One of these boys was in the early stages of the disease and had not been considered ill, and in fact attended public school until a short time ago. The other boy was a case of years' standing and had been concealed for a long time by his parents, who had evidently recognized the nature of the malady.

### *Another Menace to California.*

The writer announced at the Sacramento meeting the existence of hookworm infection in mines in this State, a fact discovered by Dr. Sprague of Jackson